Report on the 1987 Losses of Container Stock in the Thunder Bay Area

Ontario

Ministry of Natural Resources

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THUNDER BAY CONTAINER STOCK LOSS INVESTIGATION

OBJECTIVE:

- To ensure a consistent, high quality supply of containerized tree seedling production given the unacceptable level of losses over the past 2 years and in 1987 in particular.

PROBLEM IDENTIFICATION:

- Unacceptable tree mortality has occurred in the Thunder Bay area in 1987. The mortality numbered 6.9 million seedlings and became apparent in March and April. Direct costs of the losses are $600,000 and indirect costs associated with reforestation efforts are $450,000. Causes of losses in 1985 and 1986, though smaller, were also of concern.

SUMMARY OF FINDINGS:

- The 1986/87 seedling mortality resulted from desiccation or drying out. Factors predisposing the seedlings to desiccation were: inadequate root systems and inadequate seedling hardiness. Climatic conditions were not the primary cause of the mortality.

  The report recommends that organizational changes should be made in three main areas:

  (a) That the Ministry acts to reduce mortality risks and more properly identify the responsibilities related to the growing and storage of the seedlings.

  (b) That these measures will involve a change in contractual arrangements that define the standards and responsibilities in the production of healthy stock.

  (c) That steps will be taken to provide technical advice concerning the production and winter storage of seedlings.

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FINDINGS

- In determining the cause of mortality, the team examined a series of elements (factors) involved in the production of stock that either lead to the mortality or to the increased risk of its occurrence.

  In this examination, the focus was placed on corrective actions in both immediate and longer time frames.

ADMINISTRATION:

- Responsibilities and accountability for the program have not been clearly evident to both growers and end-users. In particular, private growers have found it difficult to accept advice and direction from staff that were responsible for both technical matters and contractual obligations. Responsibilities must be clearly communicated, understood and administered.

  The Ministry has the responsibility for the production of seedlings for forest renewal on Crown lands and therefore must ensure that the most effective practices are used to produce healthy stock.

RECOMMENDATION NO. 1:

(a) That the Region put in place an administrative structure for container stock production which clearly identifies the responsibilities for:

*** contracting - both negotiation and administration;**

*** stock inventory, monitoring, allocation and shipping;**

*** technical advice and research support.**

(b) That the Region and the Thunder Bay Growers Association commence negotiations for the provision of technical expertise to growers, specifically, advice and assistance concerning cultural practices and growing techniques. The Association is to be responsible for the employment and the costs are to be shared jointly with the Ministry.

The plan for the implementation of this recommendation is to be reviewed by the Region with the ADM Northern Ontario by June 30th, 1987.

- Steps must be taken immediately by each Region to put in place better contractual arrangements for the provision of healthy trees for forest renewal operations.

  Contracts, while clearly stating terms, conditions and obligations, must provide for the necessary flexibility to ensure that healthy stock will be produced.

  Responsibilities and payment schedules must be related and the responsibilities for growing healthy trees separated from those for winter storage. This separation, while not precluding both growing and storage by one party, would also allow for storage by another party, especially a user of the stock such as the Ministry or Forest Management Agreement (FMA) holder.

RECOMMENDATION NO. 2:

1a) Contracts for growing:

Payment Schedule ... (i) Costs of materials at time of contract execution.
(ii) Remainder of negotiated crop price paid upon receipt of healthy trees.

b) Contracts for over-winter storage:

Payment Schedule ... Full payment upon receipt of healthy trees in spring (date to be specified).

2. Contract for growing and over-winter storage:

Payment Schedule ... (i) 50% of negotiated price paid at time of contract execution.
(ii) 50% of negotiated price paid for healthy trees at crop delivery date.

These options are to be considered in all future Ministry contract negotiations and tendering procedures.

- An FMA holder may undertake to grow the seedlings required by contracting directly with a private grower. This arrangement will provide for stronger linkages between grower and user and an excellent opportunity to produce seedlings to match the sites to be planted.

RECOMMENDATION NO. 3:

That all regions must provide the option for FMA holders to contract with the private growers for the production of container seedlings.

- Contracts must require growers to implement an effective monitoring system which assesses those features critical to users requirements and seedling health and survival. These features are measures of height, diameter, dry weight, root growth and frost hardiness during the seedling's production. The records of these measures are to be available at the grower's greenhouses for inspection by the Ministry and forest industry users on a regular basis.

  Additionally, the Ministry and the forest industry user must inspect and measure the seedlings being grown for their use at least twice to confirm the growers records and seedling development and health. These inspections and measurements are most appropriate at the time of spring and fall inventories.

  Sometimes a user may have demonstrable evidence of poor cultural practices or negligence which may jeopardize the production of healthy stock and render it subject to risks which result from those cultural practices. When this evidence is presented to the grower, future payments may be withheld pending a 30-day test period to confirm whether or not the trees are normal and healthy. If they are so determined, the deferred monies will be paid together with interest.

RECOMMENDATION NO. 4:

That growers implement an effective seedling monitoring system incorporating those elements that are critical to user requirements and seedling health. Those records are to be available to all end-users. The system is to be in place by August 31st, 1987.

- A consistent monitoring system at all regions, which incorporates measures which identify healthy seedlings, is not in place. This, together with inadequacies in the coordination of stock production provincially, maintenance of meaningful communications between the users of stock (Ministry and forest industries), Regions and Forest Resources Group. Lack of rapid responses to identified field problems by Regions and Forest Resources Group has created major difficulties. In particular, senior Ministry staff have not been kept informed in a timely manner of impending changes and losses in stock production and their causes in the provincial production system.

RECOMMENDATION NO. 5:

(a) That for inspection purposes, each Region must maintain the capability to measure and monitor stock for inventory and quality.

(b) That the Stock Production Unit Supervisor in Forest Resources Branch be responsible for maintaining an up-to-date documentation on supply and demand for stock, forecasts of stock production with particular attention to probable losses. This documentation to be based on regular Regional reports on the supply of healthy trees and will be placed in a provincial report to the Assistant Deputy Ministers for Northern and Southern Ontario by December 31 and March 31 of each year.

- The investigation of the mortality of over-wintered stock noted that the present system of double cropping resulted in a higher mortality risk for the second crop of black spruce. While this may seem to argue that only a single crop be produced, it was also clear that production of two crops a year allows for a more effective means of reducing capital costs of production. In addition, it is noted that jack pine has less over-wintered mortality than black spruce.

A two crop system with black spruce as the first crop and jack pine as the second crop, with both crops for over-wintering could be used. This will initially require some adjustment in stock production arrangements to meet existing planting requirements, primarily by an increase in seedling production in the spring of 1988.

Another factor which should be taken into account in re-assessing short-term stock production requirements, is that certain FMA holders have a need for large size, transplant black spruce bare root stock. The Thunder Bay nursery has the capability of producing such stock and also produces some 4 million 2+0 jack pine bare root seedlings.

One result of this initiative may be an increase in the availability of the number of trees to be planted in the spring. The Region should carefully examine the biological and operational implications of this action.

RECOMMENDATION NO. 6:

(a) That the present two crop container system be retained where and when needed, but preferably with black spruce as the first crop and jack pine as the second.

(b) That jack pine bare root production at Thunder Bay nursery be significantly reduced, if not phased out, and that the nursery substitute jack pine seedlings with black spruce transplants. The production of container jack pine by private growers is thus to be increased in order to make up for the reduction in jack pine bare root stock.

Action must be taken by the Region on this recommendation by June 30th, 1987.

SCIENTIFIC:

- The principal cause of seedling mortality was desiccation. Factors pre-disposing the seedlings to desiccation were: inadequate root development, root mortality and inadequate seedling hardiness. Clearly weather conditions effect moisture loss from any plant, but in itself, climatic condition cannot be viewed as the determining factor for these seedling losses. In the past, far too much emphasis has been placed on weather as a causal factor and not enough on the fitness of the trees.

  Certain key cultural practices were identified as requiring particular attention. These were:

  * the irrigation of seedlings to control growth;

  * the variation in peat properties used as a rooting medium;

  * the recognition of temperature and other climatic factors which can affect seedling health.

  The availability of technological advice and assistance on a regular "on call" basis has been addressed in Recommendation No. 1(b). However, problems will inevitably arise which will require definition and analysis if effective research is to be undertaken for their solution.

  The responsibility to arrange for the necessary scientific input for problem analysis and resolution is clearly within the mandate of the local Technology Development Unit.

  RECOMMENDATION NO. 7:

  That the local Technology Development Unit, in concert with the grower(s), user(s) and extension specialist, must arrange for the application of science to the problem.

- Two problem areas identified in this investigation related to water regulation and associated variations in peat quality as the growing medium.

  RECOMMENDATION NO. 8:

  That the Ministry, in conjunction with the growers, develop specifications for peat as a growing medium for seedling container stock. Forest Resources Group is to commence action on this task by June 30th, 1987.

- It appeared that water stresses on seedlings often lead to diseased roots and subsequent mortality.

RECOMMENDATION No. 9:

That Forest Resources Group, beginning in 1987, strengthen support in forest pathology at Pest Control Section in order to provide a more effective service to container seedling growers.

- The scientists taking part in the investigation recognized a greater need for more effective communication among themselves. They therefore resolved that:

  The scientists involved in this investigation will take the initiative to conduct formal meetings of scientists in the province dealing with all aspects of container seedling research. The first meeting will be held within three months and be convened by Dr. C. Glerum of the Ontario Tree Improvement and Forest Biomass Institute.

- It is important to emphasize that cultural practices developed as a result of research tc solve a particular problem cannot be expected to minimize or prevent losses from other causes. Extended Greenhouse Culture has been widely misunderstood. It was developed to prevent freezing damage to shoots. It could not have prevented the desiccation which caused the present seedling mortality. Continued efforts to refine this cultural technique should be undertaken and must be coupled with studies on root hardiness.

  Throughout this investigation the need for meaningful communication between the Ministry staff and private growers was continually emphasized.

  Presently, crops for 1988 delivery are being grown. These crops are being produced under current contracts and cultural techniques which are felt to be inadequate. Losses in 1988 are to be avoided and, therefore, ministry staff and private growers must pay great attention to present practices to ensure that healthy seedlings are ready for over-winter storage.

RECOMMENDATION No. 10:

That the Provincial Forester and Regional Director in each Region meet with the private growers to present the findings of the investigation and the actions which have or are being taken as a result. These meetings are to commence in June, 1987.

IMPLEMENTATION PLAN FOR ACTION IN RESPONSE TO THE THUNDER BAY CONTAINER STOCK LOSS INVESTIGATION REPORT

The report of the Investigation into the Thunder Bay Container Stock Loss focussed on corrective actions that are to be taken immediately and in the longer term. These actions are both administrative and scientific in nature.

The plan that follows details the course of action to be taken, assigns tasks and sets time-frames.

	Action	Who	When
1.	(a) Meeting with private growers in Thunder Bay area to discuss loss report.	Provincial Forester and Regional Director of North Central Region.	Prior to public release of report.
	(b) Meetings with private growers in North-western, Northern, and Northeastern Regions to discuss loss report.	Provincial Forester and each Regional Director.	Meetings to be completed by July 15, 1987.
2.	Care and monitoring of the Spring 1988 crop.	Private growers, Regional Director North Central Region and OTIFBI (Maple and Thunder Bay).	Immediately to May 31, 1988.
	i) direct, control and coordinate the production of healthy containerized tree seedlings.	Regional Director, North Central Region.	Immediately and until crop shipped.

Action		Who	When
ii)	convene an information meeting with growers to affirm the Ministry's concern over seedling failures and to discuss the action plan to lessen the risk of future losses.	Regional Director, North Central Region.	June 12, 1987.
iii)	determine the potential for seedling losses of each grower and focus remedial efforts accordingly.	Regional Director, North Central Region.	June 5, 1987.
iv)	assist MNR by providing cultural schedules and seedling growth objectives.	Growers.	June 5, 1987.
v)	monitor weekly growth and physiological progression to ensure development of healthy seedlings.	Growers.	June 1, 1987 - December 1, 1987.
vi)	become aware of existing and new growing technology and apply appropriate procedures to ensure the production of a healthy seedling crop.	Growers.	Ongoing process.
vii)	Thunder Bay and Maple forest scientists to collaborate on all matters of seedling	MNR Research: OTIFBI.	June 1, 1987 - May 31, 1988.

Action		Who	When
	production. Assist Region and growers in the production and maintenance of healthy containerized seedlings for spring shipment.		
viii)	recommend to Region any required changes in growing regimes and/or schedules.	MNR Research: OTIFBI.	June 1, 1987 - May 31, 1988.
ix)	coordinate collection of seedlings from growers for seedling growth and physiological monitoring.	OTIFBI: Thunder Bay.	June 1, 1987 - December 1, 1987
x)	provide advice and assistance to the Region and growers for the production of healthy containerized seedlings and prevention of spring desiccation and disease.	OTIFBI: Thunder Bay.	June 1, 1987 - May 31, 1988.
xi)	evaluate seedling vitality throughout each phase of production and storage.	OTIFBI: Thunder Bay.	June 1, 1987 - May 31, 1988.
xii)	undertake reevaluation of seedling sampling procedures and techniques and make any necessary revisions to ensure confidence	OTIFBI: Maple.	June 1, 1987 - December 10, 1987.

Action		Who	When
	in frost hardiness determinations of the whole seedling's readiness for over winter storage.		
xiii)	apply other applicable frost hardiness determination techniques to ensure seedling readiness for outside winter storage.	OTIFBI: Maple.	September 1, 1987 - December 1, 1987.
xiv)	provide advice to the Region and growers on all matters pertaining to the protection of seedling crops from insect attack and disease infection.	Forest Resources Branch, Pest Control Section.	June 1, 1987 - May 31, 1988.
3.	Provision of identification of administrative structure and accountability for container production programme to ADM Northern Ontario.	North Central Regional Director, other Northern Regional Directors to provide to ADM Northern Ontario for approval.	Organizational outline to ADM by June 30, 1987. Approval by July 15, 1987.
4.	Provision of Technical expertise for cultural advice.	Thunder Bay Growers Assoc. and Regional Directors North Central Region to provide plan to ADM Northern Ontario.	Plan for position establishment and duties to ADM Northern Ontario by June 30, 1987. Approval by ADM by July 15, 1987.
5.	Changes in payment schedules to be incorporated in all	All Northern Regional Directors and Forest	Immediately.

	Action	Who	When
	future contracting and tendering procedures.	Resources Branch must incorporate new payment schedule options. ADM Northern Ontario and Forest Resources Group to approve changes.	
6.	Establishment of FMA/Grower contracts.	All Northern Regional Directors.	Immediately.
7.	Implement seedling development and health monitoring system.	Private growers, Regional Director, North Central Region and OTIFBI (Maple and Thunder Bay.)	System to be in place and operational by August 31, 1987.
8.	Development of a Regional and Provincial stock monitoring system for inventory and seedling health. Regional reports submitted to Forest Resources Branch.	All Northern Regional Directors and Forest Resources Branch.	Immediate monitoring. Regional reports to Forest Resources Branch by November 30, and March 15. Provincial reports to Field ADMs by Dec. 31, and March 31.
9. (a)	Shift from spruce to pine as second crop.	North Central Regional Director and private growers. Forest Resources Branch to monitor species and crop changes.	Region to inform Forest Resources Branch of changes and implications by June 30, 1987.
(b)	Phase out of jack pine bare root production at Thunder Bay Nursery with corresponding increase in private grower jack pine production.	North Central Regional Director. Forest Resources Branch to monitor species and crop changes.	As above.

	Action	Who	When
10.	The North Western Technology Development Unit involvement in problem solving.	Regional Director, North Central Region and TDU Manager.	Immediately.
11.	Development of peat specifications for use as a growing medium.	Forest Resources Branch and Private Growers.	Plan for specification development in place by June 30, 1987.
12.	Strengthening of capacity in Forest Pathology to service growers.	Forest Resources Branch.	Plan to improve service to be in place by June 30 1987.
13.	Communication among Ontario container production scientists and holding of formal meetings.	Dr. C. Glerum.	First meeting to be held by August 31, 1987.

The Executive Co-ordinator of Forest Resources Group will undertake to follow-up and monitor the implementation of these actions and report on progress to the ADM Northern Ontario every two months or as required.